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10/713,486	11/14/2003	Howard S. David	0294374 p15159	9195

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EXAMINER	
DARE, RYAN A	
ART UNIT	**PAPER NUMBER**
2186	

DATE MAILED: 08/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/713,486	DAVID, HOWARD S.	
	Examiner	Art Unit	
	Ryan Dare	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-9,12-17,19,21-23,25-31,33-38 and 40-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-9,12-17,19,21-23,25-31,33-38 and 40-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 5, 12 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim, US PG Pub 2004/0093461, in view of Brucke, US PG Pub 2005/0088894.

4. With respect to claim 5, Kim teaches a method of operating a memory device having multiple memory bank arrays and being responsive to command signals and a plurality of bank address signals, the method comprising:

specifying at least one of a multiple of memory bank arrays to be refreshed using a plurality of bank address signals, in pars. 23-24;

initiating in response to first command signals an auto-refresh command controlling an auto refresh operation to the specified at least one of the multiple memory bank arrays, in pars. 23-24 and 27-28.

Kim fails to teach a staggered refresh. Brucke teaches a staggered refresh wherein multiple rows per memory bank array are refreshed in a staggered fashion per the auto-refresh, in par. 25.

5. It would be obvious to one of ordinary skill in the art, having the teachings of Kim and Brucke before him at the time the invention was made, to modify the memory refresh method of Kim with the memory refresh system of Brucke, in order to allow multiple rows to be refreshed in a staggered fashion with just one auto-refresh command, thereby decreasing the total refresh commands necessary to refresh a memory, as taught by Brucke in par. 25.

6. With respect to claim 12, Applicant claims an article comprising a storage medium having stored thereon instructions that when executed by a machine result in performing the method of claim 5, and is therefore rejected using similar logic.

7. With respect to claim 21, Kim teaches a memory device responsive to command signals and bank address signals, the memory device comprising:

multiple memory bank arrays, each memory bank array having storage cells, in the Abstract; and

a command controller/decoder responsive to selected command signals and bank address signals to initiate an auto-refresh command controlling an auto refresh

operation to at least one specified memory bank array of the multiple memory bank arrays, in fig. 3, command decoder 20, and par. 36.

Kim fails to teach a staggered refresh. Brucke teaches a staggered refresh wherein multiple rows per memory bank array are refreshed in a staggered fashion per the auto-refresh, in par. 25.

8. It would be obvious to one of ordinary skill in the art, having the teachings of Kim and Brucke before him at the time the invention was made, to modify the memory refresh method of Kim with the memory refresh system of Brucke, in order to allow multiple rows to be refreshed in a staggered fashion with just one auto-refresh command, thereby decreasing the total refresh commands necessary to refresh a memory, as taught by Brucke in par. 25.

9. Claims 1-2, 6-9, 13-15, 23, 25-31, 33-38 and 40-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim, US PG Pub 2004/0093461, in view of Proebsting, US Patent 6,871,261, further in view of Brucke, US PG Pub 2005/0088894.

10. With respect to claim 1, Kim teaches a method of operating a memory device having multiple memory bank arrays and being responsive to command signals and a plurality of bank address signals, the method comprising:

specifying at least one of a multiple of memory bank arrays to be refreshed using a plurality of bank address signals, in pars. 23-24;

initiating in response to first command signals an auto-refresh command controlling an auto refresh operation to the specified at least one of the multiple memory bank arrays, in pars. 23-24 and 27-28.

Kim fails to teach the last limitation of claim 1. Proebsting teaches initiating, before or during the auto refresh operation to the at least one of the specified memory bank arrays, a second command signal controlling a second operation, other than an auto refresh operation, to a second memory bank array of the multiple memory bank arrays, which is not one of the at least one of the specified memory bank arrays being refreshed, in col. 2, lines 43-50.

Kim and Proebsting fail to teach a staggered refresh. Brucke teaches a staggered refresh wherein multiple rows per memory bank array are refreshed in a staggered fashion per the auto-refresh command and the second operation begins after all the rows have begun the auto refresh operation, in par. 25.

11. With respect to claim 2, Kim teaches the method of claim 1, wherein the specified at least one of the multiple memory bank arrays is specified in logic based on the plurality of bank address signals received, in pars. 27-28.

12. It would be obvious to one of ordinary skill in the art, having the teachings of Kim and Proebsting before him at the time the invention was made, to modify the memory refresh method of Kim with the memory refresh method of Proebsting, because it allows both operations to complete in the same clock cycle as taught by Proebsting in col. 2, lines 43-47. This makes it so that a read or write does not have to be stalled as long as the particular memory bank array is not being accessed, and thus saves time.

Furthermore, it would be obvious to one of ordinary skill in the art, having the teachings of Kim, Proebsting and Brucke before him at the time the invention was made, to modify the memory refresh method of Kim and Proebsting with the memory refresh system of Brucke, in order to allow multiple rows to be refreshed in a staggered fashion with just one auto-refresh command, thereby decreasing the total refresh commands necessary to refresh a memory, as taught by Brucke in par. 25.

13. With respect to claim 6, Kim, Proebsting and Brucke teach all other limitations of the parent claim as discussed supra, but implements the invention on a DRAM and not on an SDRAM. As is known in the art, a SDRAM is simply a DRAM that employs a bursting technique that predicts the next memory location to be accessed. Therefore, benefits achieved by Kim's invention will have the same positive effect on an SDRAM as it will on a non-synchronous DRAM.

14. It would have been obvious to one of ordinary skill in the art at the time the invention was made, to implement the present invention on an SDRAM since this is a type of a DRAM which will also use the benefits achieved by the Kim invention, such as reducing power consumption and decreasing noise by reducing peak operation current, as taught by Kim in the last sentence of the Abstract.

15. With respect to claim 13, Applicant claims an article comprising a storage medium having stored thereon instructions that when executed by a machine result in performing the method of claim 6, and is therefore rejected using similar logic

16. With respect to claim 7, the combination of Kim, Proebsting and Brucke teaches all other limitations of the parent claim as discussed supra. Proebsting further teaches

the method of claim 3, wherein the second operation is selected from the group consisting of activate operations, read operations, write operations and precharge operations, in col. 2, lines 43-50. Although Proebsting only mentions read and write operations, in view of Applicant's Related Art, it is inherent that these include activate and precharge operations. Applicant discloses that access operations include activate and precharge operations in page 1, line 17, through page 2, line 13. Therefore, Proebsting also teaches performing activate and precharge operations since these are inherent to the read and write operations it discloses.

17. With respect to claims 8-9, Applicant claims an article comprising a storage medium having stored thereon instructions that when executed by a machine result in performing the method of claims 1-2, and are therefore rejected using similar logic.

18. With respect to claim 14, Applicant claims an article comprising a storage medium having stored thereon instructions that when executed by a machine result in performing the method of claim 7, and is therefore rejected using similar logic.

19. With respect to claim 15, Kim teaches a memory device responsive to command signals and bank address signals, the memory device comprising:

multiple memory bank arrays, each memory bank array having storage cells, in the Abstract; and

a command controller/decoder responsive to selected command signals and bank address signals to initiate an auto-refresh command controlling an auto refresh operation to at least one specified memory bank array of the multiple memory bank arrays, in fig. 3, command decoder 20, and par. 36.

Kim fails to teach the last part of claim 1. Proebsting teaches: before or during the auto refresh operation to the at least one of the specified memory bank arrays, issuing a second command signal controlling a second operation, other than an auto refresh operation, to a second memory bank array of the multiple memory bank arrays, which is not one of the at least one of the specified memory bank arrays being refreshed, in col. 2, lines 43-50.

Kim and Proebsting fail to teach a staggered refresh. Brucke teaches a staggered refresh wherein multiple rows per memory bank array are refreshed in a staggered fashion per the auto-refresh command and the second operation begins after all the rows have begun the auto refresh operation, in par. 25.

20. It would be obvious to one of ordinary skill in the art, having the teachings of Kim and Proebsting before him at the time the invention was made, to modify the memory refresh method of Kim with the memory refresh method of Proebsting, because it allows both operations to complete in the same clock cycle as taught by Proebsting in col. 2, lines 43-47. This makes it so that a read or write does not have to be stalled as long as the particular memory bank array is not being accessed, and thus saves time. Furthermore, it would be obvious to one of ordinary skill in the art, having the teachings of Kim, Proebsting and Brucke before him at the time the invention was made, to modify the memory refresh method of Kim and Proebsting with the memory refresh system of Brucke, in order to allow multiple rows to be refreshed in a staggered fashion with just one auto-refresh command, thereby decreasing the total refresh commands necessary to refresh a memory, as taught by Brucke in par. 25.

21. With respect to claim 23, Proebsting teaches the memory device of claim 15, wherein the second operation is selected from the group consisting of activate operations, read operations, write operations and precharge operations, in col. 2, lines 43-50. Although Proebsting only mentions read and write operations, in view of Applicant's Related Art, it is inherent that these include activate and precharge operations. Applicant discloses that access operations include activate and precharge operations in page 1, line 17, through page 2, line 13. Therefore, Proebsting also teaches performing activate and precharge operations since these are inherent to the read and write operations it discloses.

22. With respect to claim 26, Kim teaches a method of operating a device having multiple memory bank arrays and being responsive to command signals and a plurality of bank address signals, the method comprising:

specifying at least one of a multiple of memory bank arrays to be refreshed using a plurality of bank address signals, in pars. 23-24; and

initiating in response to first command signals an auto-refresh command controlling an auto refresh operation to the specified at least one of the multiple memory bank arrays, wherein multiple rows per memory bank array are refreshed per auto-refresh command, in pars. 23-24 and 27-28.

Proebsting teaches:

initiating, before or during the auto refresh operation to the at least one of the specified memory bank arrays, a second command signal controlling a second operation, other than an auto refresh operation, to a second memory bank array of the

multiple memory bank arrays, which is not one of the at least one of the specified memory bank arrays being refreshed, in col. 2, lines 43-50.

Kim and Proebsting fail to teach a staggered refresh. Brucke teaches a staggered refresh wherein multiple rows per memory bank array are refreshed in a staggered fashion per the auto-refresh command and the second operation begins after all the rows have begun the auto refresh operation, in par. 25.

23. It would be obvious to one of ordinary skill in the art, having the teachings of Kim and Proebsting before him at the time the invention was made, to modify the memory refresh method of Kim with the memory refresh method of Proebsting, because it allows both operations to complete in the same clock cycle as taught by Proebsting in col. 2, lines 43-47. This makes it so that a read or write does not have to be stalled as long as the particular memory bank array is not being accessed, and thus saves time. Furthermore, it would be obvious to one of ordinary skill in the art, having the teachings of Kim, Proebsting and Brucke before him at the time the invention was made, to modify the memory refresh method of Kim and Proebsting with the memory refresh system of Brucke, in order to allow multiple rows to be refreshed in a staggered fashion with just one auto-refresh command, thereby decreasing the total refresh commands necessary to refresh a memory, as taught by Brucke in par. 25.

24. With respect to claim 25, Kim teaches a method of claim 26, wherein the specified at least one of the multiple memory bank arrays is specified in logic based on the plurality of bank address signals received, in pars. 27-28.

25. With respect to claim 27, Kim, Proebsting and Brucke teach all other limitations of the parent claim as discussed supra, but implements the invention on a DRAM and not on an SDRAM. As is known in the art, a SDRAM is simply a DRAM that employs a bursting technique that predicts the next memory location to be accessed. Therefore, benefits achieved by Kim, Proebsting's and Brucke's invention will have the same positive effect on an SDRAM as it will on a non-synchronous DRAM.

26. It would have been obvious to one of ordinary skill in the art at the time the invention was made, to implement the invention of Kim, Proebsting and Brucke on an SDRAM since this is a type of a DRAM which will also use the benefits achieved by the Kim, Proebsting and Brucke inventions, such as reducing power consumption and decreasing noise by reducing peak operation current, as taught by Kim in the last sentence of the Abstract.

27. With respect to claim 28, Kim, Proebsting and Brucke teach all other limitations of the parent claim as discussed supra. Proebsting further teaches the method of claim 26, wherein the second operation is selected from the group consisting of activate operations, read operations, write operations and precharge operations, in col. 2, lines 43-50. Although Proebsting only mentions read and write operations, in view of Applicant's Related Art, it is inherent that these include activate and precharge operations. Applicant discloses that access operations include activate and precharge operations in page 1, line 17, through page 2, line 13. Therefore, Proebsting also teaches performing activate and precharge operations since these are inherent to the read and write operations it discloses.

28. With respect to claim 29, Kim, Proebsting and Brucke teach all other limitations of the parent claims as discussed supra. Proebsting further teaches the method of claim 28, wherein second command signals, to initiate an activate operation to open a page not to be refreshed, are issued by the memory controller after first command signals to initiate an auto-refresh command controlling an auto refresh operation to the specified at least one of the multiple memory bank arrays to be refreshed, in preparation for issuing second command signals to initiate read operations or write operations to the open page. Although Proebsting does not expressly mention performing the activate operation before the read or write, it would be obvious to one of ordinary skill in the art to do activate a row before reading from it. This is taught by Applicant in the Discussion of Related Art on page 2, lines 3-13. Since an activation is a necessary part of a read or write, this would be an essential and obvious operation to perform.

29. With respect to claim 30, Kim teaches a memory controller for controlling a memory device having multiple memory bank arrays comprising:

a processor for scheduling and generating a plurality of bank address signals, first command signals, and second command signals, wherein the plurality of bank address signals specifies at least one of a multiple of memory bank arrays to be refreshed, the first command signals initiate an auto-refresh command controlling an auto refresh operation to the specified at least one of multiple memory bank arrays, in pars. 23-24 and 27-28. Kim fails to teach the second command signals that read or write from another memory bank array.

Proebsting teaches second command signals that initiate, before or during the auto refresh operation to the at least one of the specified memory bank arrays, a second command controlling a second operation, other than an auto refresh operation, to a second memory bank array of the multiple memory bank arrays, which is not one of the at least one of the specified memory bank arrays being refreshed, in col. 2, lines 43-50.

Kim and Proebsting fail to teach a staggered refresh. Brucke teaches a staggered refresh wherein multiple rows per memory bank array are refreshed in a staggered fashion per the auto-refresh command and the second operation begins after all the rows have begun the auto refresh operation, in par. 25.

30. It would be obvious to one of ordinary skill in the art, having the teachings of Kim and Proebsting before him at the time the invention was made, to modify the memory refresh method of Kim with the memory refresh method of Proebsting, because it allows both operations to complete in the same clock cycle as taught by Proebsting in col. 2, lines 43-47. This makes it so that a read or write does not have to be stalled as long as the particular memory bank array is not being accessed, and thus saves time. Furthermore, it would be obvious to one of ordinary skill in the art, having the teachings of Kim, Proebsting and Brucke before him at the time the invention was made, to modify the memory refresh method of Kim and Proebsting with the memory refresh system of Brucke, in order to allow multiple rows to be refreshed in a staggered fashion with just one auto-refresh command, thereby decreasing the total refresh commands necessary to refresh a memory, as taught by Brucke in par. 25.

31. With respect to claim 31, Kim teaches the memory controller of claim 30, wherein the specified at least one of the multiple memory bank arrays is specified in logic based on the plurality of bank address signals received, in pars. 27-28.

32. With respect to claim 33, Kim teaches a memory controller for controlling a memory device having multiple memory bank arrays comprising:

a processor for scheduling and generating a plurality of bank address signals, first command signals, and second command signals, wherein the plurality of bank address signals specifies at least one of a multiple of memory bank arrays to be refreshed, the first command signals initiate an auto-refresh command controlling an auto refresh operation to the specified at least one of multiple memory bank arrays, in pars. 23-24 and 27-28. Kim fails to teach the second command signals that read or write from another memory bank array.

Proebsting teaches second command signals that initiate, before or during the auto refresh operation to the at least one of the specified memory bank arrays, a second command controlling a second operation, other than an auto refresh operation, to a second memory bank array of the multiple memory bank arrays, which is not one of the at least one of the specified memory bank arrays being refreshed, in col. 2, lines 43-50.

Kim and Proebsting fail to teach a staggered refresh. Brucke teaches a staggered refresh wherein multiple rows per memory bank array are refreshed in a staggered fashion per the auto-refresh command, in par. 25.

33. It would be obvious to one of ordinary skill in the art, having the teachings of Kim and Proebsting before him at the time the invention was made, to modify the memory refresh method of Kim with the memory refresh method of Proebsting, because it allows both operations to complete in the same clock cycle as taught by Proebsting in col. 2, lines 43-47. This makes it so that a read or write does not have to be stalled as long as the particular memory bank array is not being accessed, and thus saves time. Furthermore, it would be obvious to one of ordinary skill in the art, having the teachings of Kim, Proebsting and Brucke before him at the time the invention was made, to modify the memory refresh method of Kim and Proebsting with the memory refresh system of Brucke, in order to allow multiple rows to be refreshed in a staggered fashion with just one auto-refresh command, thereby decreasing the total refresh commands necessary to refresh a memory, as taught by Brucke in par. 25.

34. With respect to claim 34, Kim and Proebsting teach all other limitations of the parent claim as discussed supra, but implement the invention on a DRAM and not on an SDRAM. As is known in the art, a SDRAM is simply a DRAM that employs a bursting technique that predicts the next memory location to be accessed. Therefore, benefits achieved by Kim and Proebsting's invention will have the same positive effect on an SDRAM as it will on a non-synchronous DRAM.

35. It would have been obvious to one of ordinary skill in the art at the time the invention was made, to implement the invention of Kim and Proebsting on an SDRAM since this is a type of a DRAM which will also use the benefits achieved by the Kim and

Proebsting inventions, such as reducing power consumption and decreasing noise by reducing peak operation current, as taught by Kim in the last sentence of the Abstract.

36. With respect to claim 35, the combination of Kim and Proebsting teaches all other limitations of the parent claim as discussed supra. Proebsting further teaches the memory controller of claim 30, wherein the second operation is selected from the group consisting of activate operations, read operations, write operations and precharge operations, in col. 2, lines 43-50. Although Proebsting only mentions read and write operations, in view of Applicant's Related Art, it is inherent that these include activate and precharge operations. Applicant discloses that access operations include activate and precharge operations in page 1, line 17, through page 2, line 13. Therefore, Proebsting also teaches performing activate and precharge operations since these are inherent to the read and write operations it discloses.

37. With respect to claim 36, Kim and Proebsting teach all other limitations of the parent claims as discussed supra. Proebsting further teaches the memory controller of claim 35, wherein second command signals, to initiate an activate operation to open a page not to be refreshed, are issued by the memory controller after first command signals to initiate an auto-refresh command controlling an auto refresh operation to the specified at least one of the multiple memory bank arrays to be refreshed, in preparation for issuing second command signals to initiate read operations or write operations to the open page. Although Proebsting does not expressly mention performing the activate operation before the read or write, it would be obvious to one of ordinary skill in the art to do activate a row before reading from it. This is taught by Applicant in the Discussion

of Related Art on page 2, lines 3-13. Since an activation is a necessary part of a read or write, this would be an essential and obvious operation to perform.

38. With respect to claims 37-38 and 40-43, Applicant claims a system that comprises the memory device and controller of claims 30-31 and 33-36, and is therefore rejected using similar logic.

39. Claims 16-17, 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim, Proebsting and Brucke as applied to claims 1-2, 6-9, 13-15, 23, 25-31, 33-38 and 40-43 above, in view of Zheng, US Patent 6,195,303.

40. With respect to claim 16, Kim, Proebsting and Brucke teach all other limitations of the parent claim as discussed supra, but fails to teach an order of refreshing as described in claim 16. Zheng teaches a memory device, wherein the at least one specified memory bank array of the multiple memory bank arrays is determined based on which memory bank arrays have been refreshed and a subsequent known order of refreshing the memory bank arrays, in col. 3, lines 33-39.

41. It would have been obvious to one of ordinary skill in the art, having the teachings of Kim, Proebsting, Brucke, and Zheng before him at the time the invention was made, to modify the memory refresh method of Kim, Proebsting and Brucke with the memory refresh method of Zheng, in order to reduce the overhead required to operate the DRAM, since refreshes will occur automatically without external commands, and will be timed such that data is never lost, as taught by Zheng in col. 12, lines 1-9.

42. With respect to claim 17, Zheng teaches the method of claim 16, wherein the at least one specified memory bank array of the multiple memory bank arrays is determined based on a command specifying which bank is to be next refreshed and a subsequent known order of refreshing the memory bank arrays, in col. 3, lines 33-39.

43. With respect to claim 19, Zheng teaches the memory device of claim 15, further comprising a refresh counter for incrementing an address of a row to be refreshed, wherein the refresh counter has a separate counter portion for each of the multiple memory bank arrays, in col. 9, lines 12-20.

44. With respect to claim 22, Kim, Proebsting, Brucke and Zheng teach all other limitations of the parent claim as discussed supra, but implements the invention on a DRAM and not on an SDRAM. As is known in the art, a SDRAM is simply a DRAM that employs a bursting technique that predicts the next memory location to be accessed. Therefore, benefits achieved by Kim and Zheng's invention will have the same positive effect on an SDRAM as it will on a non-synchronous DRAM.

45. It would have been obvious to one of ordinary skill in the art at the time the invention was made, to implement the invention of Kim and Zheng on an SDRAM since this is a type of a DRAM which will also use the benefits achieved by the Kim and Zheng inventions, such as reducing power consumption and decreasing noise by reducing peak operation current, as taught by Kim in the last sentence of the Abstract.

Response to Arguments

46. Applicant's arguments, filed 6/12/06, with respect to Tsern reference have been fully considered and are persuasive. The Tsern reference does not teach a staggered refresh per Applicant's amended claim 1. However, the Examiner has made a new rejection using Brucke to teach a staggered refresh.

Conclusion

47. The prior art made of record on form PTO-892 and not relied upon is considered pertinent to applicant's disclosure. Applicant is required under 37 C.F.R. § 1.111(c) to consider these references fully when responding to this action. The documents cited therein teach similar memory refresh systems.

48. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Dare whose telephone number is (571)272-4069. The examiner can normally be reached on Mon-Fri 9:30-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on (571)272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ryan A. Dare
August 21, 2006

MATTHEW KIM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100